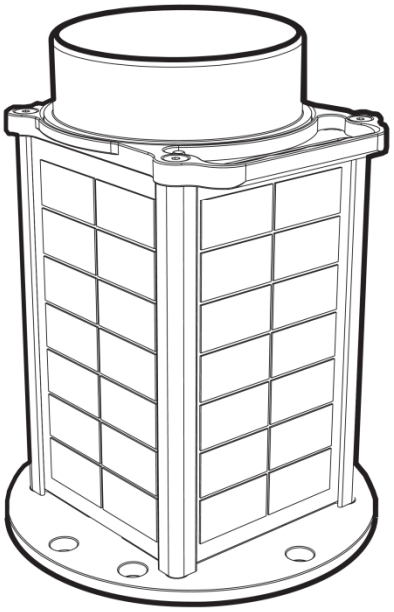
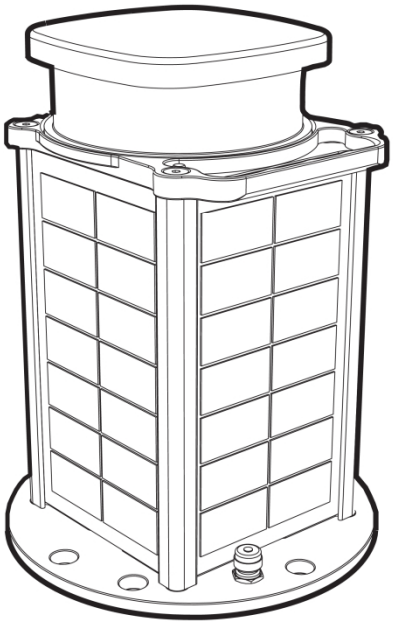
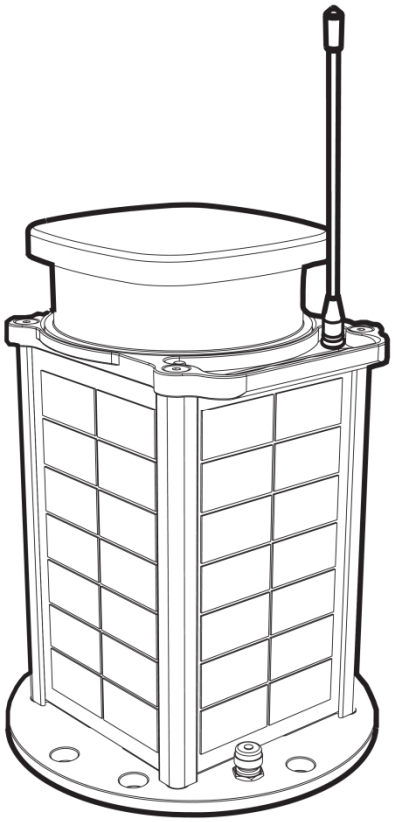
carmanah®

A700 Series

USER MANUAL







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1.0 Safety & Usage

The following symbols indicate important safety warnings and precautions throughout this manual:

WARNING indicates that serious bodily harm or death may result from failure to adhere to the precautions.

CAUTION indicates that damage to equipment may result if the instructions are not followed.

NOTE suggests optimal conditions and provides additional information.

WIRELESS features and functions that require a Handheld Controller.

PUSH BUTTON features and functions that require interaction with the push button on the light.

1.1 Viewing Precautions

Do not view an actively emitting infrared or visible light from the side of the light (close to or on beam) from a range of less than 4 ft. (1.2 m).

A safe limit for near-infrared viewing, established by the American Conference of Governmental and Industrial Hygienists (ACGIH), is 65 mW/in^2 (10 mW/cm^2) as the maximum exposure limit for viewing for up to 16 minutes. This power density can be produced at the lens surface when actively emitting infrared light.

1.2 Battery Precautions

Use extreme caution when handling the light. This product is capable of generating enormous short-circuit currents. Remove all jewelry (bracelets, metal-strap watches, rings) before attempting to handle or remove the batteries.

Charge your battery periodically. Permanent damage and reduced capacity will result if the battery is not correctly maintained.

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The rate of battery self-discharge is very dependent upon temperature. The warmer the temperature, the faster the batteries will discharge.

Lights that have been stored will usually require a top-up charge before they are put into service. The most accurate battery health status reading is obtained when the unit has been in a dark location and in off mode for at least 24 hours.

1.3 Wireless Precautions

Keep the Handheld Controller at a distance of at least 3 ft. (1 m) from the antennas of lights or other Handheld Controllers. It transmits a powerful radio signal that could damage sensitive receiver circuitry if operated at close range.

1.4 Regulatory

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications; however, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off or on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna;
- Increase the separation between the equipment and receiver;
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected;
- Consult the dealer or an experienced radio/TV technician for help.

This Class [B] digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe [B] est conforme à la norme NMB-003 du Canada.

1.5 Warranty Disclaimer

This manual will familiarize you with the features and operating standards of the product. Failure to comply with the use, storage, maintenance, or installation instructions detailed in this manual could void the user warranty.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Installation work must be done by a qualified person(s) in accordance with all application local codes and standards.

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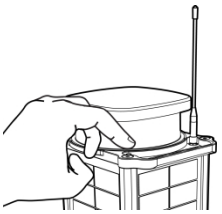
2.0 Introduction

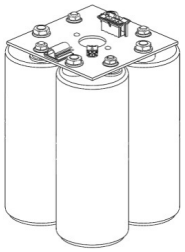
2.1 Features

The A700 Series Solar Aviation Lights have the following features:

- Self-contained, high-performance, solar-powered light source
- Optional wireless control with 2.5 miles (4 km) range with available Handheld Controller
- Easy-to-install and low-maintenance with long-life light emitting diodes (LEDs)
- Available in red, green, yellow, white, blue omnidirectional and white/white, red/green, yellow/white, and red/white bidirectional visible LED output colors
- Indicator LEDs and push button user interface



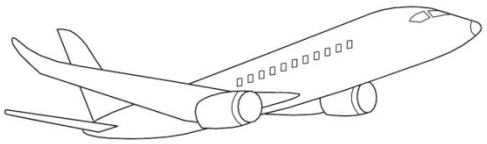
- Intelligent Energy Management System (EMS)
- Visible LED and night vision goggle (NVG)-compatible infrared (IR) LED outputs
- Aviation yellow or olive drab chassis
- Optional external connector provides long-term, high power operation and battery charging
- Replaceable battery pack



2.2 Applications

The A700 Series have the following applications:

- Runway edge (omnidirectional MIRL & directional HIRL)
- Runway threshold
- Taxiway & apron edge
- Emergency & deployable airfield
- Helipad
- Construction barricade
- Obstruction



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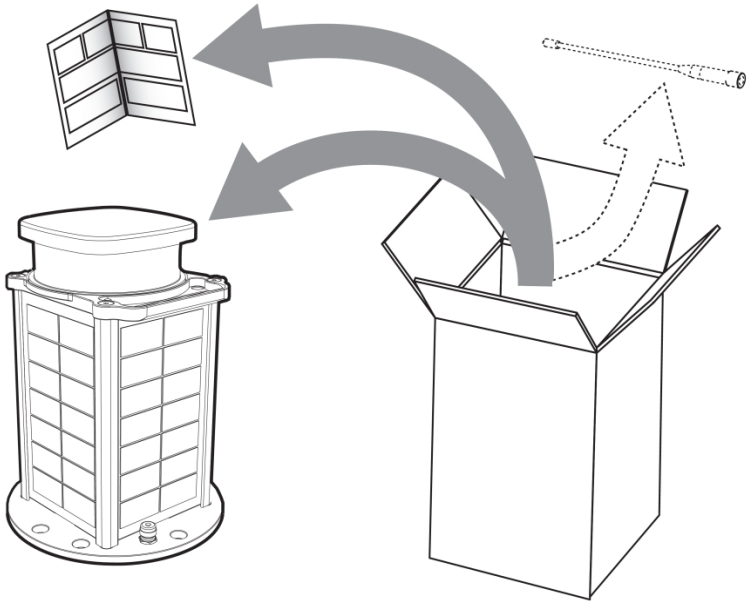
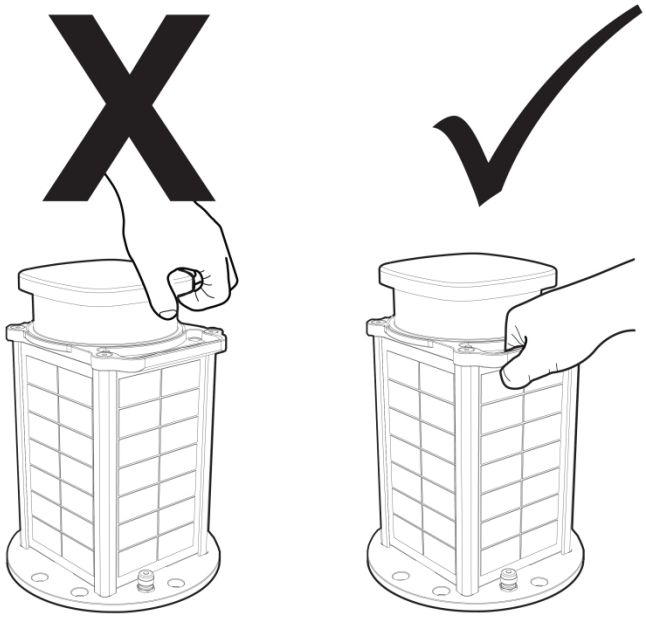
3.0 Installation

Each shipment includes:

- A700 Series Solar Light
- Manual
- Antenna (wireless models only)





This document is available for download from www.carmanah.com

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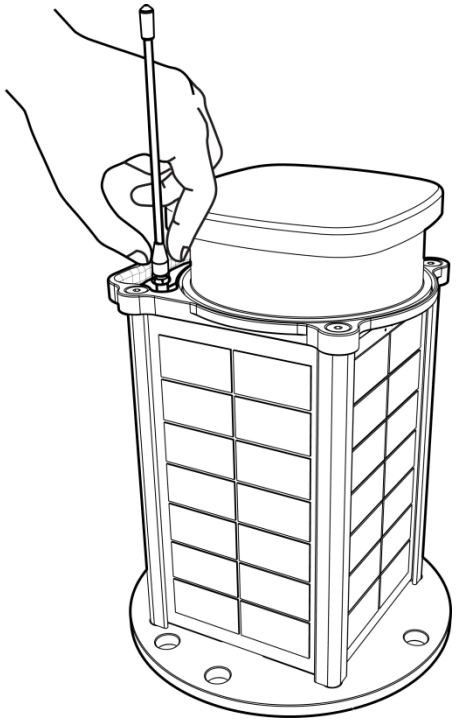
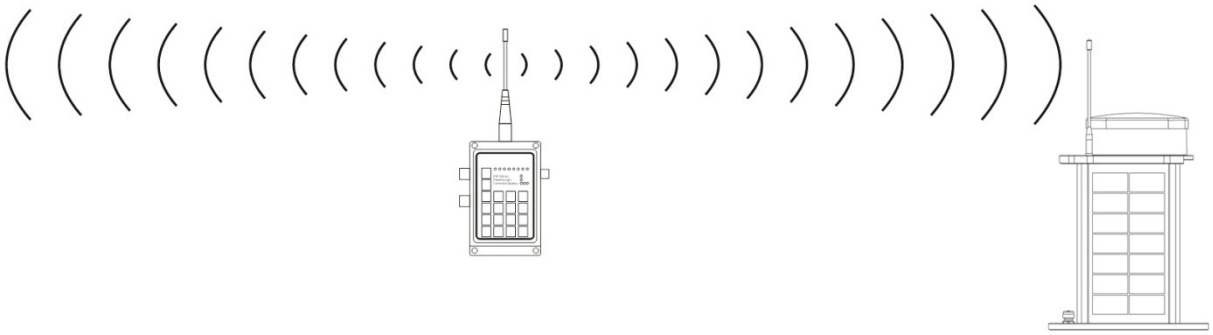
3.1 Antenna

An antenna is included with each light ordered with optional wireless control. Grip the antenna by its metal base and hand-tighten it onto the antenna connector.



The effective range of the wireless control system is 2.5 miles (4 km). Wireless range is greatly affected by use and location. To achieve the best wireless range:

- Handheld Controller antenna is parallel to the light's antenna



- Elevate the Handheld Controller's antenna
- Ensure surrounding grass and foliage is trim
- Clear line-of-sight between antennas

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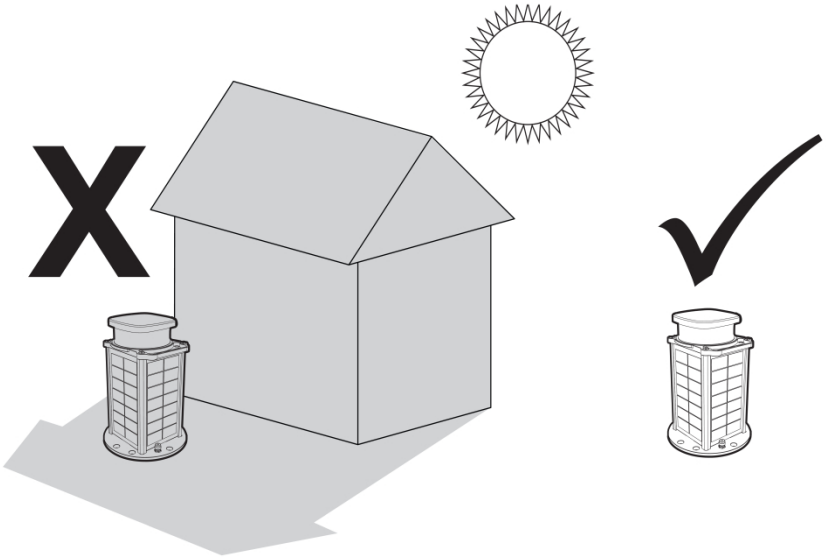
3.2 Location

Year-round, unrestricted solar exposure is critical to long-term performance.

Shade dramatically reduces the ability of the light to charge its battery.

Year-round sun: During the winter, the sun is lower on the horizon. Because the angle of the sun changes with the seasons, be aware that obstructions such as trees, buildings, and mountains that do not shade the solar panel during the summer may shade it during the winter.

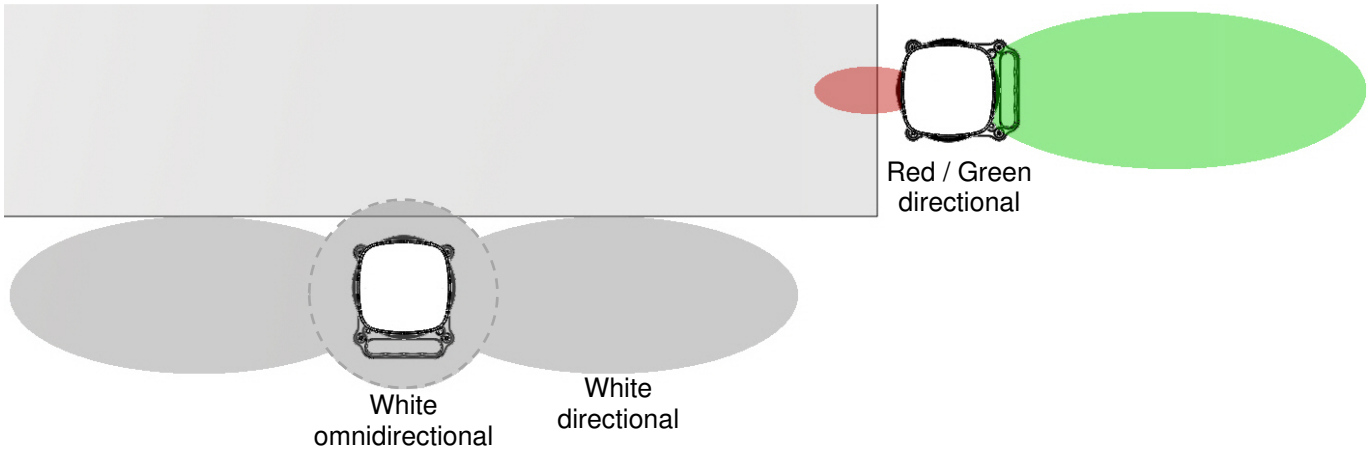


Cooler is better: The battery lasts longest if you can minimize its exposure to high temperatures. Choose a location that is away from hot, dark colored surfaces like asphalt or black steel plate. Mounting kits are available that elevate the light and can help reduce the temperature of the battery.

Flat: Ensure the mounting surface is flat and level.

3.3 Orientation

The handle can be used to orient the light relative to the runway. This is useful for directional and bidirectional lights:



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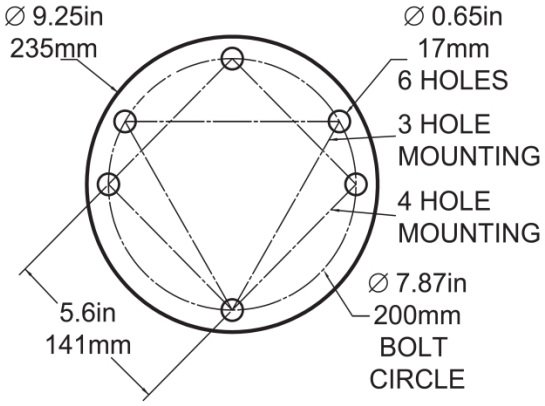
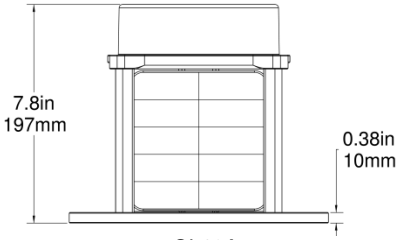
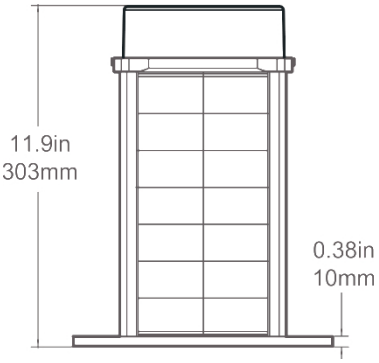
3.4 Mounting

The A700 Series can be mounted using 0.5 in. (12 mm) fasteners. Fasteners are not included but are available as kits. Mounting is common across the A700 Series.

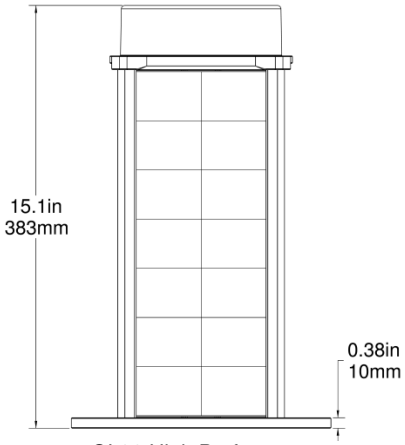




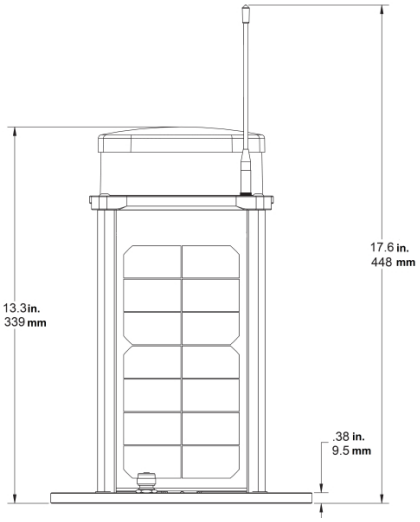
OL10A



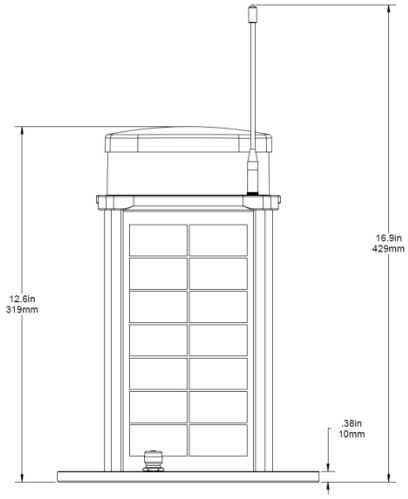
OL10A High-Performance
OL32 Standard
A703



OL32 High Performance



A704-5
(Optional wireless antenna shown)
(Optional external connector shown)



A704-H
(Optional wireless antenna shown)
(Optional external connector shown)

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4.0 Operation

4.1 Theory of Operation

During daylight, the solar panels charge the battery using the Energy Management System (EMS). The capacity of the battery ensures that even with poor levels of sunlight over an extended period, the light has enough reserve power to continue to perform reliably.

Stored battery energy is then available to power the output LEDs in one of several modes. These modes are selected using the push button user interface on the light or a Handheld Controller. The most commonly used modes are Autonomous and Temporary Modes.

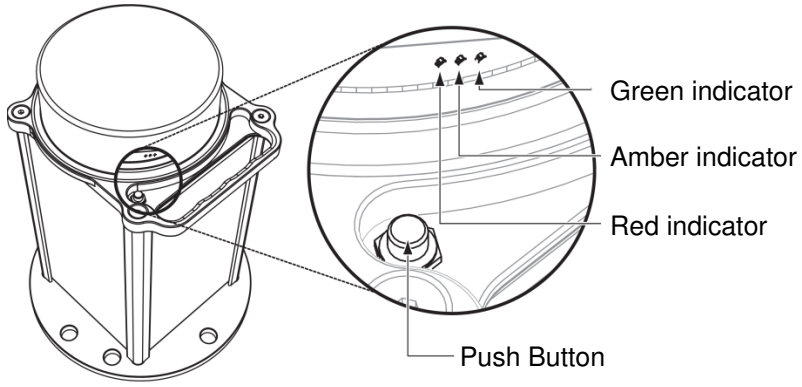
The Handheld Controller is a transmitting radio that sends commands to a receiving radio inside the light. The Handheld Controller is optional and only communicates with lights that have optional wireless control. For Handheld Controller operation and button sequences, see its manual.

4.2 User Interface

4.2.1 Indicator LEDs

Inside the lens, near the push button, are three indicator LEDs that illuminate green, amber or red. They:

- Guide push button operation
- Indicate diagnostic feedback
- Indicate normal operating state after the push button has not been used for 10 sec.



Indicator	Operating State
All indicators are off	Autonomous or Temporary Mode, Infrared LED output
	Storage Mode
Green indicator flashes 1x every 2 sec.	Autonomous or Temporary Mode, Visible LED output
Amber indicator flashes 1x every 1 sec.	Battery is charging via the external connector
Amber indicator flashes 1x every 2 sec.	Battery is charging via the solar panel

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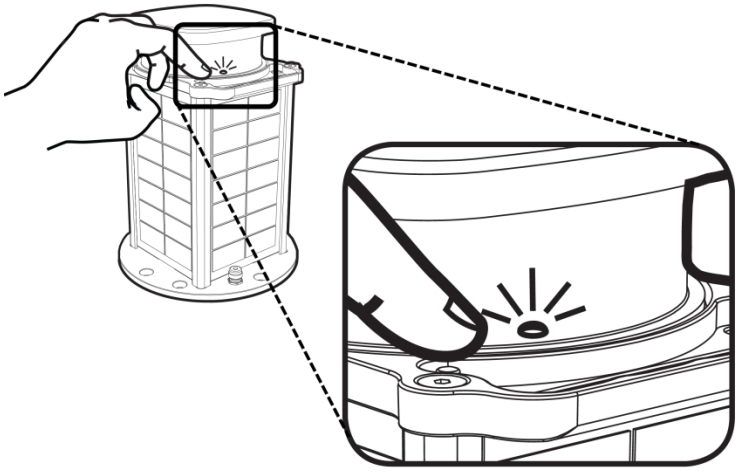
4.2.2 Push Button

The push button is used for configuration and control.



It can be used in conjunction with, or instead of, a Handheld Controller for most modes and features.

The two types of push button inputs are:

Hold Pressing and holding the push button down for several sec. will cycle through the command levels

The command level is indicated by the number of amber indicator LED flashes

Once the desired command level has been reached, release the push button

Press Momentarily pressing the push button 1x – 5x chooses a command within that command level

Each momentary press must be quick and less than 1 sec.

You must select a command within 10 sec. of entering a command level, otherwise the light exits that command level

The green indicator LED flashes the number of accepted momentary presses

The red indicator LED flashes three times if the command has not been accepted

Indicator LED and push button sequences will be referred to as:

[**hold** push button for a group of # amber flashes, **press** push button #]

For example, [4,2] is:

1. Hold the push button for a group of 4x amber flashes
2. Press the push button 2x, green indicator LED flashes quickly 2x to confirm

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The following are all available push button commands:

Step 1: Hold for a group of flashes	**Step 2: Press for command**				
	1 press	2 presses	3 presses	4 presses	5 presses
No hold ⇨	Standby Mode [0,1]	Autonomous Low [0,2]	Autonomous Med [0,3]	Autonomous High [0,4]	Flash Toggle [0,5]
1 amber flash ⇨	Temporary Low [1,1]	Temporary Med [1,2]	Temporary High [1,3]	No action	No action
group of 2 amber flashes ⇨	Storage Mode [2,1]	Do Not Use*	Do Not Use*	No action	No action
group of 3 amber flashes ⇨	Infrared Toggle [3,1]	No action	No action	No action	No action
group of 4 amber flashes ⇨	Battery Check [4,1]	UCS Status [4,2]	No action	No action	No action
group of 5 amber flashes ⇨	No action	Button Lock Toggle [5,2]	No action	No action	Factory Reset [5,5]

* For engineering purposes only; use may result in unpredictable behavior of the light.

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4.3 Modes

4.3.1 Autonomous Mode

In Autonomous Mode, the output LEDs turn on during the night and turn off during the day. The change from day-to-night or night-to-day is known as a transition. A built-in ambient brightness sensor detects transitions.

NOTE

Autonomous Mode setting is recommended by a solar simulation.
See carmanah.com for a solar simulation for your application.
Correct setting is important to ensure sustainable, year-round operation.

The Autonomous Mode setting is selected by push button sequence [0,2], [0,3], [0,4] or the Handheld Controller:

Setting	Intensity	Output LEDs	Flashing	Active
AUTO LOW	Low	Visible	No	Dusk-to-dawn
AUTO MED	Medium	Visible	No	Dusk-to-dawn
AUTO HIGH	High	Visible	No	Dusk-to-dawn
AUTO LOW IR	Low	Infrared	No	Dusk-to-dawn
AUTO MED IR	Medium	Infrared	No	Dusk-to-dawn
AUTO HIGH IR	High	Infrared	No	Dusk-to-dawn
AUTO LOW FLASH	Low	Visible	0.25 sec. on, 0.75 sec. off	Dusk-to-dawn
AUTO MED FLASH	Medium	Visible	0.25 sec. on, 0.75 sec. off	Dusk-to-dawn
AUTO HIGH FLASH	High	Visible	0.25 sec. on, 0.75 sec. off	Dusk-to-dawn
AUTO LOW IR FLASH	Low	Infrared	0.25 sec. on, 0.75 sec. off	Dusk-to-dawn
AUTO MED IR FLASH	Medium	Infrared	0.25 sec. on, 0.75 sec. off	Dusk-to-dawn
AUTO HIGH IR FLASH	High	Infrared	0.25 sec. on, 0.75 sec. off	Dusk-to-dawn

Factory default is AUTO LOW, visible LED, steady-on.

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4.3.2 Temporary Mode

A Temporary Mode activation interrupts other modes and ignores transitions. This activation lasts for a preset time and then the light reverts to its previous Autonomous Mode.

NOTE

Maximum number of Temporary Mode activations per day is recommended by a solar simulation. See carmanah.com for a solar simulation for your application.
Correct usage is important to ensure sustainable, year-round operation.

The Temporary Mode setting is selected by push button sequence [1,1], [1,2], [1,3], or the Handheld Controller:

Setting	Intensity	Output LEDs	Flashing	Activation, Handheld Controller command	Activation, push button command
TEMP LOW	Low	Visible	No	15 min.	60 min.
TEMP MED	Medium	Visible	No	15 min.	60 min.
TEMP HIGH	High	Visible	No	15 min.	60 min.
TEMP LOW IR	Low	Infrared	No	15 min.	60 min.
TEMP MED IR	Medium	Infrared	No	15 min.	60 min.
TEMP HIGH IR	High	Infrared	No	15 min.	60 min.
TEMP LOW FLASH	Low	Visible	0.25 sec. on, 0.75 sec. off	15 min.	60 min.
TEMP MED FLASH	Medium	Visible	0.25 sec. on, 0.75 sec. off	15 min.	60 min.
TEMP HIGH FLASH	High	Visible	0.25 sec. on, 0.75 sec. off	15 min.	60 min.
TEMP LOW IR FLASH	Low	Infrared	0.25 sec. on, 0.75 sec. off	15 min.	60 min.
TEMP MED IR FLASH	Medium	Infrared	0.25 sec. on, 0.75 sec. off	15 min.	60 min.
TEMP HIGH IR FLASH	High	Infrared	0.25 sec. on, 0.75 sec. off	15 min.	60 min.

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4.3.3 Standby Mode

Standby Mode turns off the output LEDs and waits for the next day-to-night transition. After this transition, the light enters its previous Autonomous Mode.

Standby Mode is enabled by push button sequence [0,1] or the Handheld Controller.

4.3.4 Lights Off Mode

Lights Off Mode turns off the output LEDs indefinitely until it receives a command to turn them on.

Lights Off Mode is enabled by the Handheld Controller.

4.3.5 Emergency Mode

Emergency Mode sets all lights in all groups to emergency flash. Emergency flash is TEMP HIGH FLASH. After 15 min., the lights revert to their previous Autonomous modes.

Emergency Mode is enabled by the Handheld Controller.

4.3.6 ARCAL Mode

The Aircraft Radio Control of Aerodrome Lighting (ARCAL) feature works in conjunction with an ARCAL VHF receiver to allow aircraft pilots to control the lights.

ARCAL Mode is enabled by the Handheld Controller.

4.3.7 Storage Mode

Storage Mode is a low power state used for storing or shipping the light. Lights are shipped from the factory in Storage Mode:

- No response to wireless control and not able to turn on its output LEDs
- Indicator LEDs are off
- Stores the last mode before entering Storage Mode
- Sunlight or external power will continue to charge the battery

NOTE If the ambient light level is 30 lux or less for 24 hrs., the light will automatically enable Storage Mode

Storage Mode is enabled by push button sequence [2,1] or the Handheld Controller.
To disable Storage Mode, press the push button 1x.

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4.4 Features

4.4.1 Low Voltage Disconnect

Low Voltage Disconnect (LVD) protects the battery from being discharged to levels low enough to cause permanent damage. When LVD is entered:

- Radio and output LEDs are disabled
- Output LEDs flashes 0.1 sec. every 60 sec. to let the user know the light needs attention
- Red indicator LED is flashing
- Battery continues charging
- When the battery state of charge reaches an acceptable level, LVD is exited.

LVD is enabled in all modes.

4.4.2 Automatic Light Control

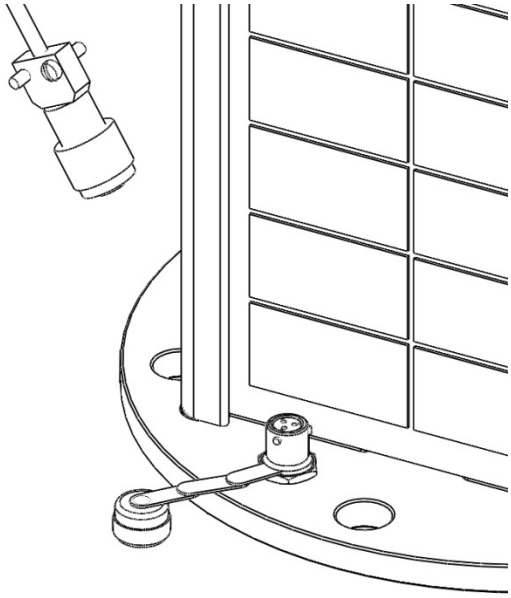
Automatic Light Control (ALC) is a patented algorithm that matches the light's energy consumption to its energy storage. As the battery state of charge diminishes, ALC decreases the output LED intensity. ALC has 4 intensity steps until finally entering LVD. The ALC step depends on the battery state of charge. This ensures the light will continue to operate through periods of poor sunlight.

ALC is enabled in all Autonomous Modes.

ALC is disabled in all Temporary Modes.

4.4.3 External Power Operation

If continuous high intensity output or backup power is required, external power can be provided to the connector on the base plate:



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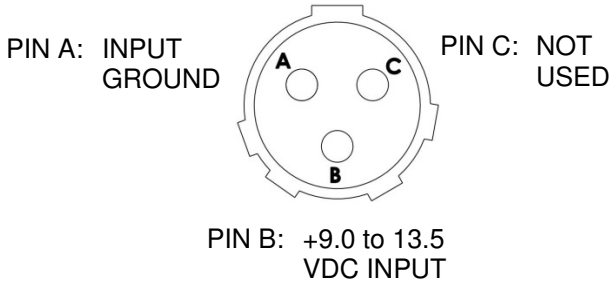
Remove the connector cap and attach a power cable terminated with the correct mating connector and pinout:



- MS3116 connector detailed in MIL-DTL-26482 (approved vendor: Amphenol PT06-E-8-3P-SR-025)
- Connector accepts 24 – 20 AWG stranded wire
- +9.0 to 13.5 VDC input @ 2.2 A max.

When connected, external power is used to power up the light and charge its battery.

External power is not a control signal and cannot configure the light. The push button or Handheld Controller is still used for normal operations.

NOTE

When external power is provided to the connector on the base plate, the light will not exit Temporary Mode after a preset time.

It will remain in Temporary Mode until commanded otherwise or until the light detects that external power is no longer available.

4.4.4 Battery Check

Push button sequence [4,1] checks the battery state of charge. The indicator LEDs then show the following for 10 sec.:

Indicator	Battery State of Charge
Green	Good, 75 – 100%
Amber	Charge, 50 – 75%
Red	LVD, 5 – 50%
Flashing Red	LVD, < 5%

4.4.5 Flash Toggle

Push button sequence [0,5] toggles between steady-on and flashing output LEDs.

4.4.6 Infrared Toggle

Push button sequence [3,1] toggles between visible and infrared output LEDs.

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4.4.7 Push Button Lock Toggle

Push button sequence [5,2] toggles between locking and unlocking the push button:

- Red indicator LED flashes 2x when the push button is first locked
- When locked, push button commands are ignored
- If any other push button command is given other than unlocking the push button, the red indicator LED flashes 3x
- Green indicator LED flashes 2x when the push button is unlocked

4.4.8 Diagnose

The battery state of charge and radio health can be queried via the Handheld Controller using its Diagnose function.

Diagnose is disabled when LVD is entered.

4.4.9 Grouping

Grouping allows independent control of different subsets of lights on an airfield:

- There are 8 groups, numbered 1 through 8
- Each light can be assigned to only one group
- Handheld controller can control multiple groups at a time
- A light can be reassigned to another group as required
- When adding a light to a group, the Handheld Controller re-sends the last mode to everyone in that group

In order to configure the group of a light:

1. Light must be powered for at least 10 sec. and not in Storage Mode
2. Press the push button 1x. This instructs the light to receive grouping configurations from the Handheld Controller for 5 min.
3. Grouping configuration is sent from Handheld Controller
4. After successfully receiving a grouping configuration, the light receives that group's last mode from the Handheld Controller.
5. Light exits its 5 min. window where it would receive grouping configurations.

Factory default is group 1.

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4.4.10 Unique Code Sequence

Unique Code Sequence (UCS) allows one or more Handheld Controllers to be uniquely associated to one or more lights. When UCS is enabled, the Handheld Controller sends a code with each radio transmission. Only lights configured to accept that particular code will respond to the transmission. The benefits are:

Independence	Nearby installations of lights can be operated independently by different Handheld Controllers without interference.
Security	It is not possible for another Handheld Controller to interrupt airfield operation.

The Handheld Controller cannot control UCS configured and non-UCS configured lights at the same time.

For security, the user has to manually interact with the light for UCS configuration:

1. Light must be on for at least 10 sec. and not in Storage Mode
2. Press the push button 1x. This instructs the light to receive UCS configurations from the Handheld Controller for 5 min.
3. UCS configuration is sent from Handheld Controller
4. After successfully receiving a UCS configuration, the light flashes for 5 sec.

Push button sequence [4,2] requests the UCS status from the indicator LEDs:

Indicator	UCS
Amber	Enabled
Red	Disabled

Factory default is UCS disabled.

4.4.11 Factory Reset

Push button sequence [5,5] performs a Factory Reset that sets the light back to a known state:

- AUTO LOW visible LED, steady-on
- Group 1
- UCS off

Green, amber, and red indicator LEDs momentarily turn on then turn off once the reset is complete

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5.0 Maintenance

5.1 Inspection

Although the light light is maintenance-free, significant performance gains can be made with clean solar panels and lenses:

- Clean the solar panels monthly. Use water and a soft sponge or cloth. A mild non-abrasive cleanser can be used for more stubborn residue. Rinse well.
- Clean solar panels and lenses more frequently during drier months, as they may become covered in dust more quickly. A pressure washer is not recommended.
- Visual inspection – check the exterior for cracks, missing or broken hardware or other potential problems.

5.2 Storage & Battery Charging

When storing the light, it is important to maintain the battery:

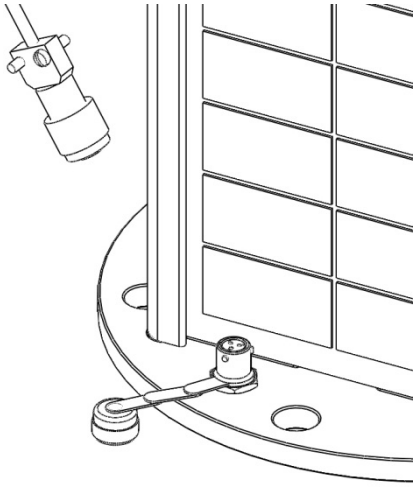
- Put the light in Storage Mode or disconnect the battery
- Store in a cool location
- Check the battery state of charge every 1 month

NOTE

Do not use the Lights Off Mode for storing the light.
The radio is still active in this mode and may receive wireless commands.

If charging is required, charge the battery fully using one of several methods:

Source	Time to Charge from 10% to 100% State of Charge
Incandescent light bulb, 60 W 12 in. (30 cm) from solar panels	>1000 hrs.
Halogen light bulb, 500 W 24 in. (60 cm) from solar panels	600 hrs.
Direct sunlight	150 hrs.
Available AC plug-in charger attached to the external connector	18 hrs.



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5.3 Battery Replacement – A704-H

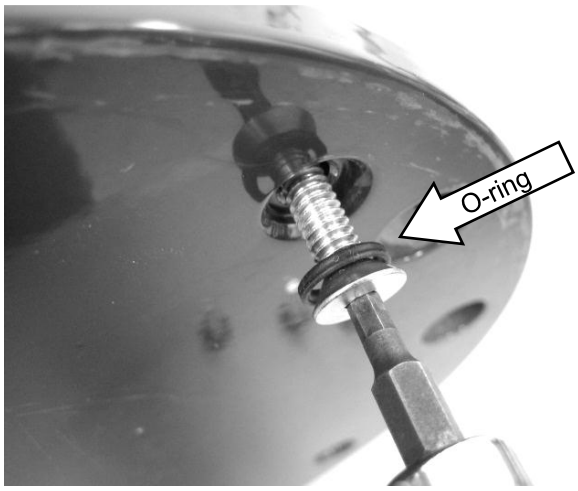
NOTE

Battery packs are not interchangeable.

Contact your distributor for your specific replacement battery pack.

If the battery is permanently damaged and needs to be replaced:

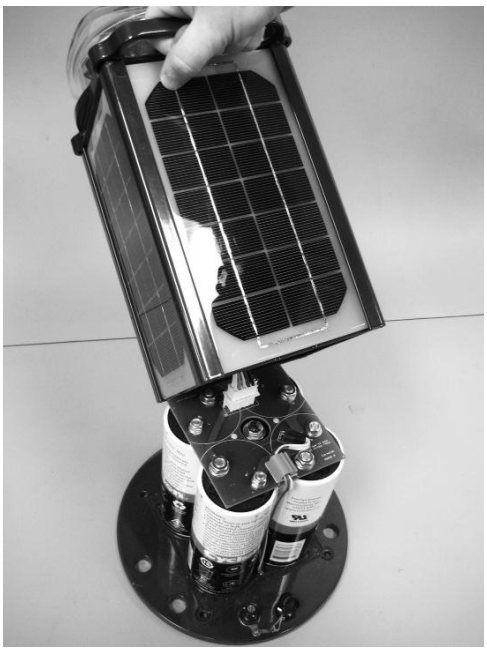
1. Remove the 4 base plate screws using a 5/32 in. hex driver; be careful not to misplace their o-rings



2. Pull on the handle to slowly separate the chassis from the base plate

WARNING

Use extreme caution with the metal chassis near the exposed battery terminals.



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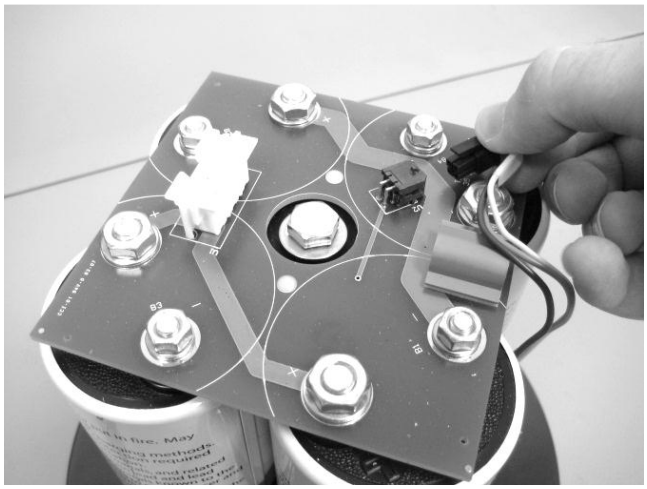
3. Disconnect the battery harness and remove the chassis

4. Disconnect the external power harness and remove from routing features



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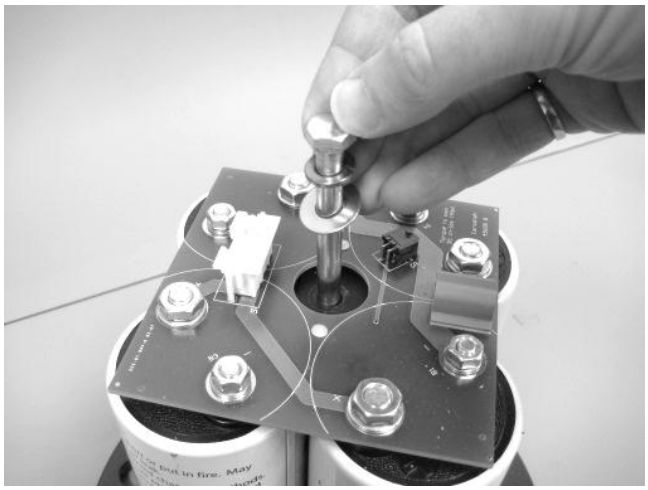
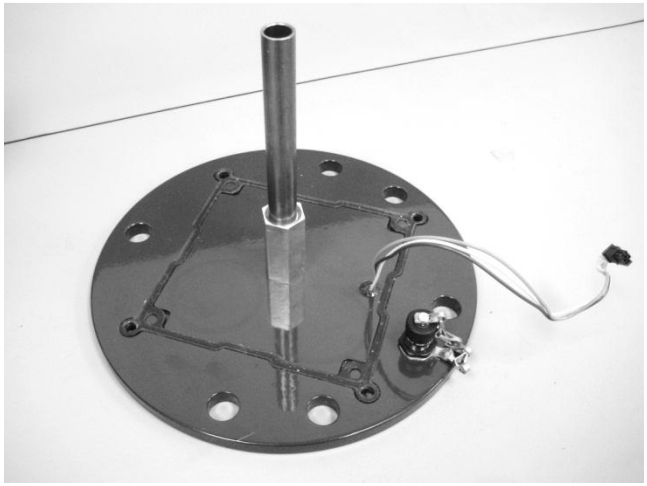
5. Using a ½ in. hex socket, remove only the central bolt and its hardware

Use extreme caution near the exposed battery terminals with metal tools.
Remove all jewelry before attempting to handle or remove the batteries.



6. Pull the battery up and over its mounting post



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Installing a battery is similar to the above steps:

1. Carefully slide the battery over the mounting post, noting the correct orientation of the battery to the external power harness.

2. Ensure the individual batteries are tight together and inside the base plate gasket. Tighten the central bolt and its hardware to 200 in.-lbs.
3. Connect the external power harness and attach it to its routing features.
4. Ensure the base plate gasket is clean and seated in its groove.
5. Hold the chassis over the battery and connect the battery harness.
6. Align the handle with the connector on the base plate and slowly slide the chassis over the battery.

7. Press base plate screw o-rings into their counterbores. Tighten 4 base plate screws to 105 in.-lbs.

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5.4 Battery Replacement – A704-5

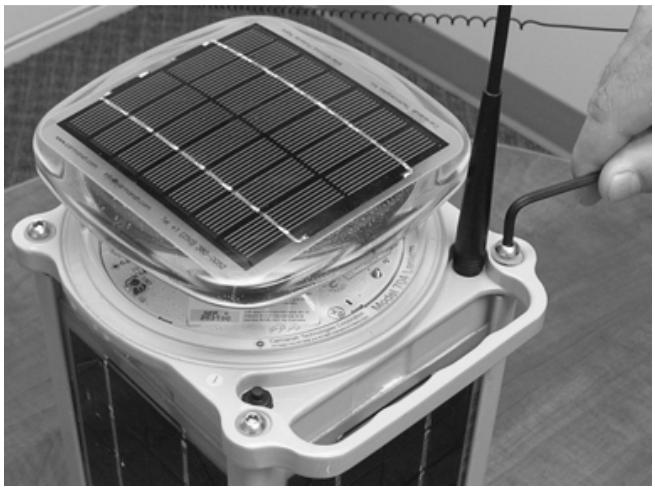
NOTE

Battery packs are not interchangeable.

Contact your distributor for your specific replacement battery pack.

If the battery is permanently damaged and needs to be replaced:

1. Remove the 4 head plate screws using a 5/32 in. hex driver



2. Pull on the handle to slowly separate the head plate from the chassis

WARNING

Use extreme caution with the metal chassis near the exposed battery terminals.

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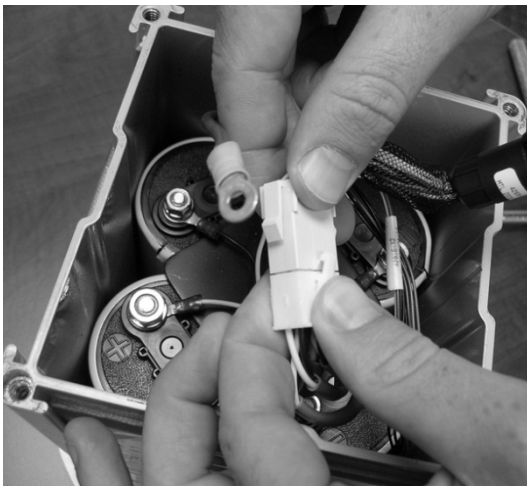
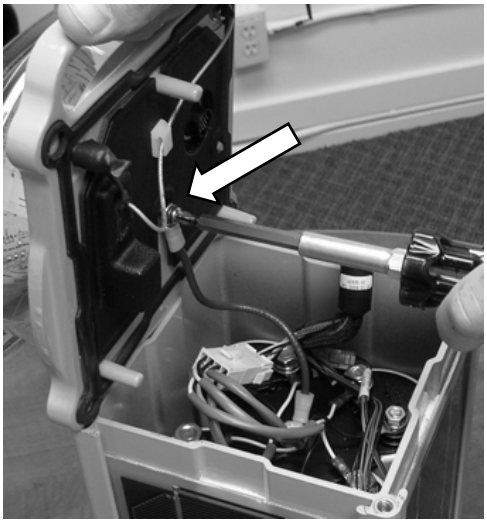
3. Disconnect the white battery harness before any other connections



4. Disconnect the main harness by carefully pinching the ribbed sides of the connector

5. Disconnect the grounding harness using a Phillips #2 screwdriver; remove the head and set aside



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6. Using a ½ in. hex socket, remove the central bolt, hardware, and grounding harness

Use extreme caution near the exposed battery terminals with metal tools.
Remove all jewelry before attempting to handle or remove the batteries.

7. Grasp the battery by its harness and pull out of the chassis; be careful around the solar panel harness

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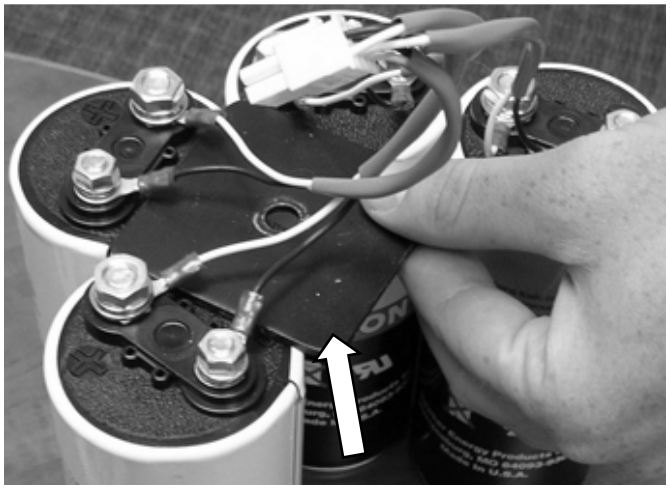
8. Remove the battery bolting plate being careful not to contact battery terminals



Installing a battery is similar to the above steps:

1. Insert battery bolting plate into new battery pack
2. Slide the battery into the chassis noting the solar panel harness
3. Insert the central bolt, its hardware, and grounding harness into the battery bolting plate; tighten bolt until the batteries are firmly held and have no play; do not over-tighten as it may damage the batteries
4. Connect the grounding harness to the head plate
5. Connect the main harness to the head plate
6. Connect the white battery harness
7. Ensure the head plate gasket is clean and seated in its groove.
8. Align the handle with the optional external connector on the base plate and slowly slide the head onto the chassis watching for any pinched wires
9. Finger-tighten 4 head plate screws, then tighten to 70 in.-lbs using a cross bolt pattern.

5.5 Recycling

This product required the extraction and use of natural resources. It may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle the product in an appropriate way that will ensure most of the materials are reused or recycled appropriately. Check your local municipality for electronics recyclers.

The symbol indicates that this product complies with the European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE).

The battery is a rechargeable lead-acid battery. Consult your local laws for information on recycling.

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6.0 Troubleshooting

Symptom	Feedback	Cause	Solution
Output LEDs are off Unresponsive to wireless control	All indicator LEDs are off	Infrared output LEDs are on	De-select the IR button on the Handheld Controller and send a visible output command; Use push button infrared toggle [3,1]
		Storage Mode is active	De-activate Storage Mode by pressing push button 1x
	Output LEDs flash once every 60 sec; Red indicator LED is flashing	LVD is entered	Charge the battery
Output LEDs are on or off Unresponsive to wireless control	Green indicator LED is flashing;	Mismatched groups	Ensure the Handheld Controller's and light's group match
		UCS is enabled	Ensure the Handheld Controller's and light's UCS match or turn off UCS
		Antenna not installed	Ensure the light's antenna is properly installed
		Handheld Controller problem	Check Handheld Controller battery, PIN status, and Passthrough
Output LEDs are off Unresponsive to wireless control Unresponsive to push button	All indicator LEDs are off	Battery is bad	Replace the battery
		Battery is not connected	Check that the battery connector is fully inserted
Output LEDs are off in Autonomous Mode	All indicator LEDs are off	Infrared output LEDs are on	De-select the IR button on the Handheld Controller and send a visible output command; Use push button infrared toggle [3,1]
	Green indicator LED is flashing	Daylight; ambient brightness is above 500 lux	Darken the entire light and wait 20 sec. for the light to turn on
		Nearby lights are illuminating the ambient brightness sensor	Increase distance between lights, turn off unneeded lights, or shield lights

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7.0 Warranty

This product is covered by the Carmanah warranty. Visit carmanah.com for additional information or to register your product online.

Before contacting Carmanah's customer service department, please have the serial number of your light available, a brief description of the problem, as well as all details of the installation and recharging efforts.

To contact Customer Service:

Mail: Carmanah Technologies Corp.
250 Bay Street
Victoria, BC Canada V9A 3K5

Phone: +1.250.380.0052 (worldwide)
1.877.722.8877 (toll-free, U.S. and Canada)

Fax: 1.250.380.0062

Email: customerservice@carmanah.com

Website: carmanah.com

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8.0 Appendices

8.1 Glossary

AC	Alternating Current
ACGIH	American Conference of Governmental and Industrial Hygienists
AGM	Absorbed Glass Matt
ALC	Automatic Light Control
ARCAL	Aircraft Radio Control of Aerodrome Lighting
DC	Direct Current
EMS	Energy Management System
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
ICAO	International Civil Aviation Organization
ICES	Industry Canada Equipment Standard
IR	Infrared
ISM	Industrial, Scientific and Medical
LED	Light Emitting Diode
LVD	Low Voltage Disconnect
NVG	Night Vision Goggle
OBUI	On-Board User Interface
RoHS	Restriction on Hazardous Substances
UCS	Universal Code Sequence
WEEE	Waste Electrical and Electronic Equipment

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8.2 Specifications

Physical	
Mounting	7.87 in. (200 mm) 3 or 4-hole bolting circle 0.5 in. (12 mm) hardware
Chassis	Powdercoated aluminum chassis, available in aviation yellow or olive drab Polycarbonate lens Waterproof, vented battery compartment
Height	See carmanah.com for each model
Width	See carmanah.com for each model
Weight	See carmanah.com for each model
Operating Temperature	-22 to 122 °F (-30 to 50 °C)
Storage Temperature	-40 to 176 °F (-40 to 80 °C)
Optical	
Light Source	High-power visible LEDs Infrared LEDs, NVG-compatible
Intensity	See carmanah.com for intensity plots, compliance, and certifications
Chromaticity	Visible: ICAO and FAA (SAE 25050) blue, red, white, yellow, and red Infrared: 870 – 890 nm peak wavelength
Flash Pattern	0.25 sec. on, 0.75 sec. off
Ambient Light Sensing	445 – 505 lux
Automatic Light Control (ALC)	Yes, ALC will reduce output intensity in response to unusually low amounts of sunlight to ensure continued operation
Color Indicator	Yes

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Energy Collection	
Control	Intelligent, microprocessor Energy Management System (EMS)
Solar Panel	High-efficiency cells Blocking diode function
Air Gap between Solar Panel and Sunlight	No, an air gap is undesirable because it refracts sunlight and decreases the amount of solar energy collected
Battery Charger	Maximum Power Point Tracking (MPPT) collects the most energy under all sunlight conditions Temperature-compensated Reverse polarity protection
Battery	Pure lead, valve-regulated lead-acid (VRLA) Absorbed glass mat (AGM) w/ metal case Recyclable
Battery Charge Connector	Yes, optional
External Power Operation	Yes, optional +9.0 to 13.5 VDC input @ 2.2 A max.
User Interface	
User Interface	Yes, push button and indicator LEDs
Datalogger	Yes
Battery State of Charge	Yes
Wireless Control (optional)	
Radio	902 – 928 MHz FHSS with encryption Up to 2.5 miles (4 km) range Replaceable antenna
Light Control	Visible, infrared, steady-on, and flashing settings Autonomous, Temporary, Standby, Lights Off, and Emergency Modes
Diagnostics	Yes
Grouping	Yes, up to 8
Universal Code Sequence (UCS)	Yes
ARCAL Control	Yes

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Standards and Testing	
ICAO Photometrics	See carmanah.com for Letters of Attestation, compliance, and certifications
FAA Photometrics	See carmanah.com for compliance and certifications
Vibration	MIL-STD-202G, Method 204, Test Condition B, 5 G peak
Shock	MIL-STD-202G, Method 213B, Test Condition G
Wind Loading	400 mph (179 m/s)
Ingress	EN 60529, IP 67 MIL-STD-202G, Method 104A, Test Condition B
Electrostatic Discharge (ESD)	EN 61000-4-2 up to ± 8 kV air and ± 4 kV contact discharge FAA-STD-019E compliant for ESD
Electromagnetic Interference (EMI) & Electromagnetic Compatibility (EMC)	FCC Part 15 emissions & immunity ICES-003 emissions & immunity EN 61000-6-3 emissions EN 61000-6-2 immunity
LED Lumen Maintenance	IES LM-80
Battery Life	IEC 61427
Humidity / Damp Heat	MIL-STD-202G, Method 103B, Test Condition B
RoHS	Yes
Patents	US 5 782 552, 6 013 985, 6 573 659 and other US and international patents apply

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